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REMARKS

Applicant concurrently files herewith an Excess Claim Fee Payment Letter and fee for one (1) excess independent claim.

Claims 1-20 are all the claims presently pending in the application. Claims 1, 9, and 10 stand rejected on prior art grounds. Applicant gratefully acknowledges that claims 2-8 would be allowable if rewritten in independent form. However, Applicant respectfully submits that all of the claims are allowable and therefore, declines to rewrite these claims at this time. Applicant reserves the opportunity to rewrite allowable claims 2-8 into independent form later. This Amendment amends claims 1-3 and 5-10 and adds new claims 11-20. Attached hereto is a marked-up version of the changes made to the claims by the current Amendment.

The claims are amended to merely clarify the subject matter of the claims and not to narrow the scope of the claims in order to overcome the prior art or for any statutory purposes of patentability. Notwithstanding any claim amendments of the present Amendment or those amendments that may be made during prosecution, Applicant's intent is to encompass equivalents of all claim elements. Further, Applicant specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Regarding the prior art rejections, claims 1, 9 and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Awamoto et al (Awamoto) (U.S. Patent No. 6,452,590).

The rejection is respectfully traversed in view of the following discussion.

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I. THE CLAIMED INVENTION

Applicant's invention, as disclosed and defined in claim 1, is directed to a drive apparatus for a plasma display panel comprising a charge recovery circuit that re-uses a recovered electrical charge, including a brightness detection circuit for detecting a brightness so as to obtain screen brightness information, and a charge recovery timing control circuit for controlling a charge recovery period from a time at which a charge recovery operation of the charge recovery circuit starts to a time of fixing to a sustaining potential or a ground potential, wherein the charge recovery timing control circuit controls the charge recovery period of the charge recovery circuit in response to the brightness information obtained by the brightness detection circuit.

A conventional device for charge recovery on an AC-type plasma display uses an LC resonant circuit. If the time constant of the LC resonant circuit is made large in order to achieve a sufficient recovery efficiency, the action of electrical charge recovery causes a loss of sharpness in the sustaining pulse applied to the scanning and common electrodes. A strong discharge increases intensity which can be achieved by advancing the timing, but this causes a decrease in charge recovery and increase in the variation in intensity.

The claimed invention, on the other hand, includes a charge recovery timing control circuit that controls the charge recovery period of the charge recovery circuit in response to the brightness information obtained by the brightness detection circuit.

These novel features allow the claimed invention to achieve both good gray-scale characteristics and peak intensity characteristics. This is accomplished by the invention controlling the charge recovery period to be long, but when the average image intensity is low,

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and the image is relatively dark, and the present invention makes the intensity of a relatively small surface area requiring the peak intensity high.

II. THE PRIOR ART REFERENCE

The Examiner alleges that Awamoto teaches the claimed invention. Applicant submits, however, that there are elements of the claimed invention which are neither taught nor suggested by Awamoto.

THE AWAMOTO REFERENCE

Awamoto discloses a driving a display panel in which power consumption due to interelectrode capacitance in the addressing period is reduced with less number of components in a driving circuit. Four switches 41-44 are provided for each of plural data electrodes. The four switches 41-44 control open and close of a current path p1 from a bias potential line 81 to the data electrode A, a current path p3 from the data electrode A to the capacitor 55, and a current path p4 from the data electrode A to the ground potential line 82.

Applicant submits that the Awamoto would not have been modified, as alleged by the Examiner, to teach the claimed invention. Indeed, the Examiner has admitted that Awamoto does not expressly teach the recovery time control circuit that controls the charge recovery period in response to the brightness information obtained by the brightness detection circuit (Office Action, p. 3).

However, the Examiner states that “it would have been obvious to a person of ordinary skill in the art . . . to realize from Awamoto’s device that the period of the charge

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recovery will depend on the brightness of the display because, if the brightness of the device is high, the period or recycling (recovering) will increase to accommodate the excess of the charges, and if the brightness of the device is low, the time of recycling will be low.” (Office Action. pp. 3-4). Applicant traverses this statement and respectfully requests evidence supporting the Examiner’s allegations. See In re Ahlert, 424 F.2d 1088, 1091; U.S.P.Q. 418, 420-421 (CCPA 1970).

The Examiner has not cited a prior art reference that suggests in some way a modification of Awamoto or a combination with another reference in order to arrive at the claimed invention. The prior art references themselves must suggest the desirability and thus the obviousness of making the combination independent of the present invention. Applicant submits that Awamoto would not have been modified by one ordinarily skilled in the art, absent hindsight.

Further, even if Awamoto were modified, the modification would not have taught or suggested each and every element of claim 1 and independent method claim 10.

Contrary to the Examiner’s assertions, Awamoto does not teach or suggest a “charge recovery timing control circuit for controlling a charge recovery period from a time at which a charge recovery operation of said charge recovery circuit starts to a time of fixing to a sustaining potential or a ground potential, wherein the charge recovery timing control circuit controls the charge recovery period of the charge recovery circuit in response to the brightness information obtained by the brightness detection circuit” (emphasis Applicant’s).

The Examiner has alleged that the power recycling circuit 33a of Figure 4 in Awamoto teaches the claimed invention. In an exemplary embodiment of the present invention, the charge recovery time controller is for varying the charge recovery period from

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the time at which the charge recovery operation of the charge recovery circuit starts to the time of fixing at a sustaining potential or the ground potential, based on the comparison results of the accumulated value comparator, wherein the charge recovery timing of the charge recovery circuit is controlled in accordance with the screen intensity detected by the image signal accumulator (Application, p. 8, lines 6-18).

Awamoto merely teaches a range of inductance values and states that the inductance “can be out of the range” to give a high priority to the charging and discharging time or power recycling ratio, yet makes no mention or disclosure of controlling the recovery period and controlling the period between certain times. In other words, Awamoto makes no disclosure or suggestion for “controlling a charge recovery period from a time at which a charge recovery operation of said charge recovery circuit starts to a time of fixing to a sustaining potential or ground potential,” as recited in claim 1. Clearly, Awamoto does not teach or suggest these novel features.

Applicant’s arguments above regarding apparatus claim 1 are incorporated into Applicant’s argument for the traverse of Examiner’s rejections of method claim 10. Awamoto does not teach or suggest the present invention, as described and disclosed in independent method claim 10, of “changing a charge recovery period from a time at which a charge recovery operation of said charge recovery circuit starts to a time of fixing to a sustaining potential or a ground potential, in response to said comparison results obtained in said comparing said value.”

That is, turning to the exemplary language of claim 1, there is no teaching or suggestion of a “*drive apparatus for a plasma display panel comprising a charge recovery circuit that re-uses a recovered electrical charge, said drive apparatus comprising . . . a*

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brightness detection circuit for detecting a brightness so as to obtain screen brightness information; and a charge recovery timing control circuit for controlling a charge recovery period from a time at which a charge recovery operation of said charge recovery circuit starts to a time of fixing to a sustaining potential or a ground potential, wherein said charge recovery timing control circuit controls said charge recovery period of said charge recovery circuit in response to said brightness information obtained by said brightness detection circuit” (emphasis Applicant’s).

For at least the reasons stated above, Applicant respectfully submits that Awamoto fails to teach or suggest every feature of claims 1, 9, and 10. Accordingly, the cited references fail to render obvious the subject matter of claims 1, 9, and 10. The Examiner is respectfully requested to reconsider and withdraw the rejection.

III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 1-20, all of the claims presently pending in the Application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.


Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

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The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE**IN THE CLAIMS:****Claims 1-9 were amended to read as follows:**

1. (Amended) A drive apparatus for a plasma display panel comprising a charge recovery circuit that re-uses a recovered electrical charge, said drive apparatus comprising:
a brightness detection [means] circuit for detecting a brightness so as to obtain screen brightness information; and

a charge recovery timing control [means] circuit for controlling a charge recovery period from a time at which a charge recovery operation of said charge recovery circuit starts to a time of fixing to a sustaining potential or a ground potential,

wherein said charge recovery timing control [means] circuit controls said charge recovery period of said charge recovery circuit in response to said brightness information obtained by said brightness detection [means] circuit.

2. (Amended) A drive apparatus for a plasma display panel according to claim 1, wherein said brightness detection [means] circuit [comprising] comprises:

an image signal accumulator for accumulating [an] a brightness of each pixel of said plasma display panel for each frame or for each field of an image signal; and

an accumulated value comparator for determining whether an accumulated value detected by said image signal accumulator is larger or smaller than a prescribed value.

3. (Amended) A drive apparatus for a plasma display panel according to claim 2, wherein said image signal accumulator accumulates [an] a brightness of all pixels in an effective display area of said plasma display panel.

5. (Amended) A drive apparatus for a plasma display panel according to claim 2, wherein said charge recovery timing control [means] circuit controls so that, when said accumulated value obtained by said image signal accumulator is lower than a prescribed value said charge recovery period is made relatively short, and further so that, when said accumulated value obtained by said image signal accumulator is higher than said prescribed value said charge recovery period is made relatively long.

6. (Amended) A drive apparatus for a plasma display panel according to claim 1, wherein said charge recovery timing control [means] circuit controls to change said charge recovery period for only a sub-field that has a relatively large brightness weight, and to leave said charge recovery period for a sub-field having a relatively small brightness weight unchanged.

7. (Amended) A drive apparatus for a plasma display panel according to claim 1, further comprising a pixel counting [means] circuit for counting a number of pixels of a brightness exceeding a pre-established reference brightness, wherein in a case in which a value counted by said pixel counting [means] circuit is below a pre-established value, said charge recovery timing control [means] circuit [control] controls so as to make said charge recovery period relatively long.

9. (Amended) A drive apparatus for a plasma display panel according to claim 1, wherein said brightness detection [means] circuit comprises a power consumption detection [means] circuit for measuring a power consumption of said plasma display panel.

10. (Amended) A method for driving a plasma display panel comprising a charge recovery circuit for re-using a recovered electrical charge, said method comprising:

[a first step of] accumulating a brightness of each pixel of said plasma display panel for each frame or for each field of an image signal;

[a second step of] comparing said value accumulated in said [first step] accumulating a brightness of each pixel so as to determine whether said value is larger or smaller than a prescribed value; and

[a third step of] changing a charge recovery period from a time at which a charge recovery operation of said charge recovery circuit starts to a time of fixing to a sustaining potential or a ground potential, in response to said comparison results obtained in said [second step] comparing said value.